NOTES ON PACIFIC COAST FISHES AND FISHERIES.

BY W. N. LOCKINGTON.

IN the market of San Francisco there was recently a specimen of *Poronotus simillimus* (the pompino of this coast) that had two mouths, one below the other, both furnished with teeth, and in size and external appearance the exact counterparts of each other. The lower mouth was situated somewhat behind the upper or normal mouth, directly beneath the eye and in front of the interoperculum. I much regret that I was unable to obtain possession of the fish, which is now, I believe, preserved in alcohol by the watchman of the market. I cannot, therefore, say anything about the bony structure of the extra mouth, or about the peculiarities of the digestive canal.

Anarrhichthys felis Grd., has, during the summer months, been frequently brought to the market of San Francisco, where it is sold as "eel," a name which is here applied to all the Blennioid fishes, as well as to *Leurynnis paucidens* and *Ophidium taylori*. Some of the dealers and fishermen, however, have given it the more appropriate name of "wolf-eel." The individuals brought to market are usually from four to five feet in length, but the species attains much larger dimensions. A specimen sent to the California Academy of Sciences, by Capt. Lawson, of the Coast Survey, and unfortunately lost through the lack of means to preserve it, measured eight feet in length; and one seven feet in length was noticed in the daily papers about three years since as an "infant sea-serpent." One large individual that lay upon the stall recently, showed the effects of a battle in the want of all that portion of the body situated posterior to the anus. The stomach of a very stout-looking example, five feet long, was opened, and was found to be filled with the tests of *Echinarachnius excentricus*, the common cake-urchin of the coast, broken into large fragments, many of them considerably more than an inch across; this Echinoderm is extremely abundant on the bar of San Francisco harbor at a depth of about seven fathoms, and the denuded tests are among the common objects of the seashore at the Cliff House.

The shark described by Ayres under the name of *Notorhynchus maculatus*, included by Günther under *Notidanus indicus*, and called by Gill (Proc. Acad. Nat. Sciences, Phila., 1864, 150) *Notorhynchus borealis*, attains considerable dimensions. An indi-

vidual taken at Long wharf, inside the harbor of San Francisco, about five years since, measures seven feet nine inches in total length.

The chimæra, *Hydrolagus colliei*, is tolerably common on the more northern parts of the Pacific coast of North America. Mr. Ivan Petroff, editor of the *Alaska Appeal*, asserts that a Chimæra which he saw and of which he made a rough sketch (which he showed me), was without the long caudal filament of *H. colliei*, and had a simple forked tail. Is it possible that there are two species of Chimæra in the North Pacific? The specimen just mentioned was taken while fishing for halibut and cod, and its stomach was filled with broken shells. I do not believe that anything is on record which tends to prove the use, in the economy of the Chimæra, of the curious projection upon the nose, armed at the end with a close-set array of hooked teeth set upon a terminal button of cartilage. The action of the individual in question, which saluted the cabin-boy who hauled it up by taking a piece out of his finger with this appendage, tends to prove that it is a weapon of offence.

The sea-basse (*Atractoscion nobilis* Gill) is one of the most highly prized of the fishes of our markets, so much so that its name is given to the flesh of other species. Thus sturgeon is usually sold in the restaurants under the name of "sea-basse," and that curious dish called "tenderloin of sole" is sturgeon again. The sea-basse is unfortunately not sufficiently abundant to supply the demand for it, and is sometimes absent from the markets for months together. It attains a considerable size, examples of from fifty to sixty pounds occur not infrequently, and individuals weighing seventy-five or even ninety-eight pounds have been brought to market. This species and *Genyanemus lineatus* are the only Sciænidæ sufficiently abundant in our markets to be of importance as articles of food.

I have not yet been able to prove whether the cod of the Pacific Coast Cod-fishery is *Gadus auratus* Cope, or *G. macrocephalus*, as at present I have only seen the dried and beheaded examples prepared for market. Appleton's Cyclopædia gives the quantity of cod-fish taken in 1870, in Alaskan waters, at 94,750 quintals; whereas the total catch of last year amounted only to about 1500 tons, or less than one-third of the former amount. This would appear to indicate a great falling off in the quantity

of fish taken, but I can scarcely believe that this offers a sufficient explanation, as, although it appears that the trade was scarcely as extensive last year as in previous years, the dealers do not speak of any considerable diminution. It appears more probable that, as all the species of *Sebastes* (*Sebastichthys*, *Sebastomus*, *Sebastosomus*, and *Sebastodes* of Gill) are commonly called rock-cod, and the large green *Ophiodon elongatus* is known as "cod," that the quantities of these fishes brought fresh to market are, in the figures given in the Cyclopædia, included along with that of the true Gadus. The dried fish has about fourteen rays in the first, fourteen in the second and seventeen in the third dorsal; with nineteen in the first, and the same number in the second anal. The first dorsal is highest, the third shortest, and the base of the second anal is shorter than that of the first. The fishery is conducted in much the same manner as that of the Atlantic; the fish are taken by trawls in shallow water, by angle-lines in deep water, and are headed, split, cleaned and salted on board ship. The drying, however, is not done on the spot but is deferred until after arrival at San Francisco. Two large establishments for drying the fish are situated within ten miles of that city, and at one of them, at least, the fish are not dried in piles, but are kept in strong red-wood tanks framed together without nails, and dried as required by the market, which is principally local. A few of the fish are, however, exported to the Pacific shore of South America and to Australia.

The angle-line is almost exclusively used in the Sea of Okkotsk, where rather the larger part of the fish are taken, partly on account of the depth of the water, but partly because of the abundance, on the sand-banks, of a small Crustacean, called by the fishermen a "sand-flea," which attacks and devours the fish upon the trawl-line before it can be drawn. The species of Orchestia and its allied genera, as well as those of Hippa, are commonly called sand-fleas on this coast.

As has been remarked on the Atlantic coast, the fish are of better quality in deep water than on the more accessible banks, but as yet the fishery is entirely carried on in what would be called shallow water in the Atlantic. In the Sea of Okkotsk forty to fifty fathoms is about the usual depth, while at the Sheumagin islands, the principal fishing locality on the Alaskan coast, ten to fifteen fathoms is the usual depth. The trawls used in the

Alaska cod-fishery are often six hundred fathoms or three thousand feet long, and bear on each side a row of hooks at every half fathom, or thereabouts. The dried fish are sorted into three sizes, the largest are put up in wooden cases, the next size in bundles, while the small fishes are divested of their skin, vertebræ and fins, cut in halves, and packed in cases under the name of "boneless cod-fish." The fishery is about fifteen years old, and at this time about thirteen vessels are engaged in it; the smaller fore-and-aft rigged vessels are principally used in Alaskan waters, while the larger square-rigged vessels run to the Sea of Okkotsk. The schooners employed at the Sheumagin islands often make two or three trips in the season. About two hundred and fifty hands are usually employed by this industry. The fishermen are paid a fixed sum per thousand fish. At Kadak natives are engaged to head, split and salt the fish, earning from seventy-five cents to one dollar per day. A few years ago the dried fish were worth nine cents per pound, but at the present time the best quality is worth only four cents.

The Alaska cod-fish is first met with in Puget sound and its vicinity, but becomes more abundant farther north. Although the principal fishing grounds are the Sea of Okkotsk and the Sheumagin islands, extensive banks exist elsewhere, and local fisheries are carried on at various points in Vancouver island, British Columbia, and along the coast of Alaska, as, for example, at Wrangel. Neither the oil from the livers, the sounds or the tongues are at present utilized. In the stomachs of those opened, various kinds of small fish and squids are stated to have been found. The fishery is at present only in its infancy, its limited extent is not in any way due to the scarcity of the fish but to the struggle that has to be maintained with the eastern article, which has so far successfully excluded the Pacific fish from the regions east of the Sierras.

The same may be said of the halibut fishery. The fish is abundant in the northern waters and attains a large size, but though small quantities have been smoked and canned, the article cannot successfully compete, even in California, with that from the Atlantic.